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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/775,315

Filing Date: February 01, 2001

Appellant(s): JUNG ET AL.

David Plumley
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed September 18, 2008 appealing from the Office action mailed March 11, 2008, and in response to the reply brief filed on February 17, 2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,783,333	MAYER	7-1998
5,429,890	PYNENBURG et al.	7-1995
7,056,622	IMACHI	6-2006
5,370,948	HASEGAWA et al.	12-1994

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mayer (U.S. Pat. 5,783,333).

Mayer teaches a lithium battery comprising a positive electrode, a negative electrode and an electrolyte, with the positive electrode having an active material of lithium nickel cobalt oxides and lithium manganese oxides. See col. 10 line 48 et seq. The lithium manganese oxides and lithium nickel cobalt oxides remain distinct chemical species, i.e. "the mixtures of this invention will include 'particles' of a first chemically distinct positive electrode material interspersed with 'particles' of a second chemically distinct positive electrode material." See col. 8 lines 46-49. The electrodes include a first binder such as water, which is subsequently evaporated, i.e. from the step of "vacuum drying the powder...." See col. 15 lines 40-61. The

electrodes include a second binder such as PVDF. See col. 16 lines 40-47. A conductive agent such as carbon is disclosed. See col. 12 line 40 et seq.

Mayer does not explicitly teach the ratio of the lithium nickel cobalt oxide and lithium manganese oxide as being less than 1:1. However, a weight ratio of the lithium manganese oxides to lithium nickel cobalt oxides of less than 1:1 would have been obvious to the skilled artisan as a routine modification of the product absent of a showing of unexpected results. *In re Thorpe*, 227 USPQ 964 (Fed. Cir. 1985). In particular, Mayer specifically teaches that blending of the two components requires optimization of their respective weights in order to obtain matched cycle ratios within the positive and negative electrode couple. See col. 10 line 14 et seq., to wit, "it may be desirable to choose relative amounts of the two or more positive electrode materials to provide an 'overall' blended first cycle charge/discharge ratio that matches the ratio for the negative electrode." Thus, absent of unexpected results it is asserted that the weight proportions of the positive electrode active materials are optimizable parameters for a result-effective variable, which in this particular case is "the cell's energy density...." *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pynenburg et al. (U.S. Pat. 5,429,890) in view of Hasegawa et al. (U.S. Pat. 5,370,948) and as evidenced by Imachi (U.S. Pat. 7,056,622 B2).

Pynenburg teaches a positive active material for a lithium battery comprising a lithium manganese oxide, LiMn_2O_4 and a lithium nickel oxide, LiNiO_2 . See col. 7 lines 55-60.

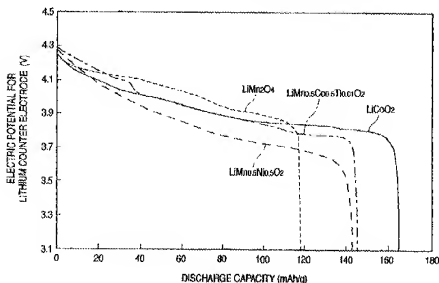
Pynenburg does not explicitly teach a lithium nickel manganese oxide. However, Hasegawa teaches replacing a portion of nickel in LiNiO_2 with manganese (Mn) so as to form lithium nickel manganese oxide, $\text{LiNiMn}_2\text{O}_4$. See col. 2 lines 35-40. Thus, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify Pynenburg's invention by replacing a portion of nickel in LiNiO_2 with manganese to form $\text{LiNiMn}_2\text{O}_4$. The motivation for such a modification would be to increase cell voltage and discharge capacity and allow for more stable compound synthesis, e.g. "the discharge capacity of the cell which comprises the positive electrode formed from the compound containing manganese is *increased* when compared with the cell which comprises the positive electrode formed from the compound containing no manganese ($x = 0$).". See col. 4 line 20 et seq.

As to the weight ratio of lithium manganese oxide to the lithium nickel manganese oxide being less than 1, absent of unexpected results it is asserted that these are optimizable parameters for result-effective variables. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) While Pynenburg et al. teaches a ratio from 1:10 to 10:1 in col. 7 lines 55-60, the relative proportions of the mixed oxide components are considered result-effective as the "cell capacity is proportional to the area under the curve of the differential cell capacity dQ/dV vs. voltage." See col. 8 line 47 et seq.

As evidence to show the differences in cell capacity and discharge capacity for the prior art oxides, Imachi et al. teaches (using line plots to illustrate Pynenburg et al.'s "area under the curve... dQ/dV ") that lithium nickel manganese oxide ($\text{LiMn}_{0.5}\text{Ni}_{0.5}\text{O}_2$ in this example) has a *higher* discharge capacity at around 145 (est.) as compared to lithium manganese oxide (LiMn_2O_4 in this example) at around 120 (est.).

See Figure 1 as appended herein:

FIG. 1



Furthermore, it appears to the examiner that the cell capacity for lithium nickel manganese oxide is higher. Thus, following Pynenburg et al.'s teaching, it would not require undue experimentation for the skilled artisan to focus on a lower ratio of lithium manganese oxides relative to lithium nickel manganese oxides. The motivation to do so is to optimize and maximize the result-effective total cell capacity, as evidenced by Imachi et al. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

(10) Response to Argument

Response to arguments for claim 11 based on Mayer (U.S. Pat. 5,783,333):

Appellant's arguments filed with the appeal brief have been fully considered, however they are not found persuasive. Appellant traverses the Office action's first position of a first binder to be evaporated not being given patentable weight insofar as in its evaporation, the binder is ultimately removed from the final product. Page 7, lines 15-18 of the specification is cited to teach that "not all of the binder is evaporated and traces of binder may remain in the chemical mixture." (appeal brief on page 3) To this end, it is asserted that the claims have been given its broadest reasonable interpretation, and even when read in light of the specification, that there *may be* traces of binder remaining in the chemical mixture is only disclosed as a mere possibility. As the claims presently read "a first binder adapted to be evaporated", the interpretation that this binder is drawn to an intermediate of the claimed battery and not its final structure is given its broadest reasonable interpretation of not being present in the final structure at all. It is noted that there is no language in the claims drawn to any traces of binder possibly remaining in the chemical mixture.

Regarding the Office action's second position (in the alternate interpretation giving the claimed binder adapted to be evaporated patentable weight in the final product, notwithstanding the foregoing discussion) of a binder such as water, which Mayer teaches, appellant submits that the water in Mayer is not akin to a first binder as it is not described as a binder or discussed as aiding the bonding of any materials. In reply, it is maintained that during the preparation of the metal oxides, the water added to the mixture functions as a binder by virtue of washing the reacted pellets and is subsequently evaporated, i.e. dried under vacuum. As to the example cited

being for the synthesis of LiNiO_2 and thus somehow not relevant to a mixture of two different oxides, this argument is not persuasive as the LiNiO_2 is formed from a mixture of two different oxides, LiNO_3 and NiO . See col. 15 lines 40-43.

Response to arguments for claims 1-4 based on Pynenburg et al. (U.S. Pat. 5,429,890) and Hasegawa et al. (U.S. Pat. 5,370,948) (with evidence by Imachi et al. (U.S. Pat. 7,056,622 B2)):

Appellant's arguments filed with the appeal brief have been fully considered, however they are not found persuasive.

First, appellant submits that Imachi et al. has an effective date of May 31, 2002 which is after the priority date of the present application and as such is said to appear improper. In reply, the examiner notes that Imachi et al., while used as a reference teaching within the context of 35 U.S.C. 103(a), is used as an *evidence document* and not as a reference for a proposed modification. Furthermore, the extrinsic evidence used to establish a property which is inherent does not have to antedate the priority date of the present application.

Secondly, appellant submits that Imachi et al. nowhere describes the mid-discharge voltages and thermal stabilities. In reply, it is noted that claims 1-4 are wholly silent on any features drawn to voltages or thermal stabilities. Thus, the extent to which any lacking disclosure in Imachi et al. drawn to voltages or thermal stabilities is not considered germane to the present invention.

Thirdly, the declaration under 37 CFR 1.132 filed on March 30, 2007 is insufficient to overcome the rejection of claims 1-4 based upon Pynenburg et al. in view of Hasegawa et al.

The comparative data shown in the declaration is not deemed representative of the ratio specifically taught by the prior art. The presented ratio of "2/8" is not considered representative of a ratio of about 4:6 as presently claimed, and much less the lower ratio of 1:9 as presently claimed. A ratio of 2/8, while clearly a ratio which is less than 4:6, is fractionally equal to 12/48, while a ratio of 4/6 is fractionally equal to 32/48. The difference amounts to over 40% which is considered significant, especially since only two data points (2/8 and 6/4) are submitted in the declaration for comparison. For these reasons and concerns, the declaration was not deemed persuasive by the examiner.

Notwithstanding, even if the data from a ratio of 2/8 were taken as representative of the entire claimed range of "4:6 to about 1:9", it is asserted that the result of a higher discharge capacity as the amount of lithium nickel manganese oxide increases is a non-obvious and *expected* result given the teachings of Pynenburg et al. that the cell capacity is proportional to the area under the curve of the differential cell capacity dQ/dV vs. voltage. It is worthwhile to note once again in this section that Pynenburg et al. specifically discloses the mixture as being in a ratio of from 1/10 to 10/1. See col. 7 lines 55-60. Within this ratio of 1:10 to 10:1 is the alleged inventive ratio of 2/8. It is asserted that optimization of the metal oxides is result-effective given that *combining* the metal oxides in and of itself would naturally comprise optimization of its relative proportions so as to achieve the increased cell capacity resulting from this combination. Thus, the combined teachings of the prior art along with the intrinsic evidence shown by Imachi et al. teach or at least suggest a ratio of less than 1:1 for lithium manganese oxide to lithium nickel cobalt oxide.

Response to the reply brief filed on February 17, 2009:

The arguments presented in the reply brief are believed to be cumulative to those considered by the examiner and replied to *supra*, with the following points for exceptions and emphasis:

On page 1 of the reply brief, appellant submits that those of ordinary skill in the art would recognize that some of the binder will remain in the mixture. Appellant cites page 7 lines 15-18 of the specification. In reply and as a matter of emphasis, the examiner asserts that the specification does not state that "some of the binder will remain in the mixture..." as asserted by appellant. Rather, the cited portion of the specification states that "the binder may be *not completely removed and a trace of the binder may be remained* in the chemical mixture...." (emphasis added) Appellant is reminded that the claims are given their broadest reasonable interpretation and in a manner which is not inconsistent with what is disclosed in the specification. To this end, the examiner maintains the position that traces of binder remaining in the chemical mixture is only disclosed as a mere possibility and not as a matter of certainty, i.e. that some of the binder *will remain* in the mixture, as appellant otherwise asserts.

The arguments on page 2 of the reply brief have been fully reconsidered. These arguments are believed to be cumulative to those already presented by appellant and subsequently considered by the examiner. As a matter of emphasis, the examiner maintains that the water added in Mayer functions as a binder insofar as it washes the reacted pellets and, in a manner similar to what is presently claimed, is subsequently evaporated. As to the argument that LiNO_3 and NiO are reacted to form LiNiO_2 and as such do not remain distinct chemical species, this argument is not persuasive as Mayer in col. 8 line 42 et seq. disclose the following:

The term "mixture" is used herein in the sense commonly employed in the chemical arts. Thus, a mixture of oxides in accordance with this invention is composed of distinct chemical species, and, in theory, can be separated by physical means. Typically, the mixtures of this invention will include "particles" of a first chemically distinct positive electrode material interspersed with "particles" of a second chemically distinct positive electrode material.

Thus, contrary to appellant's assertions, it is asserted that Mayer specifically disclose oxide materials which are bound together as "distinct chemical species".

The arguments on pages 3-4 of the reply brief have been fully reconsidered. These arguments are believed to be cumulative to those already presented by appellant and subsequently considered by the examiner. Additionally, the argument that the prior art does not teach or suggest "superior thermal stabilities and mid-discharge voltages" (top of page 3) or the similar argument that the prior art does not teach or suggest "superior mid-discharge voltages and thermal stabilities" (top of page 4) is not persuasive. The examiner maintains that the scope of the present claims are entirely silent on any limitation drawn to voltages or thermal stabilities. To this end, the examiner is unable to give patentable weight to limitations that are neither explicitly nor implicitly called for in the claims.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

Art Unit: 1795

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Julian Mercado/
Examiner of record

Conferees:

/PATRICK RYAN/

Supervisory Patent Examiner, Art Unit 1795

/Dah-Wei D. Yuan/

Supervisory Patent Examiner, Art Unit 1795